

THE TAXONOMIC SIGNIFICANCE OF CHROMOSOME NUMBERS AND GEOGRAPHY IN CRATÆGUS L.

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Crataegus L. is a relatively large genus of the Rosaceae-Pomoideae, incorporating some 200 species, with two chief centres of geographical distribution in North America and Europe-East Asia (Airy Shaw, 1973). The most comprehensive taxonomic treatment of the genus to date is that of Lange (1897), a synopsis of which is given in the following, with the N. American species indicated by an asterisk:

(A) LATERAL VEINS NEAR THE LEAF-BASE POINTING DOWNWARDS (RARELY HORIZONTAL)

I. Leaves (usually) glabrous

1. Fruit red:

a. stipules caducous: C. cordata*, C. spathulata*,
C. flabellata*, C. coccinea*, C. tiliaefolia*,
C. intricata*.

b. stipules persistent: C. sorbifolia, C. celsiana,
C. pinnatifida, C. pinnatiloba, C. monogyna,

2. Fruit yellow or green:

C. pruinosa*, C. altaica.

3. Fruit black or dark-coloured:

C. dsungarica, C. platyphylla, C. rubrinervis,
C. ambigua.

II. Leaves hirsute

1. Fruit red:

C. apiifolia*, C. polyacantha, C. pycnoloba,
C. laciniata, C. azarolus, C. tournefortii,
C. orientalis.

2. Fruit yellow:

C. tanacetifolia.

3. Fruit black or dark-coloured:

C. melanocarpa, C. lambertiana, C. nigra.

(B) LATERAL VEINS OF LEAVES ASCENDING

I. Leaves glabrous

a. Fruit red:

aa. stipules caducous: C. crus-galli*, C. fontanesiana*, C. prunifolia*, C. arborescens*, C. rotundifolia*, C. macracantha*.

bb. stipules persistent: C. sanguinea, C. heterophylla, C. oxyacantha.

b. Fruit yellow:

C. glandulosa*, C. flava*, C. lavalléi*.

c. Fruit black or dark-coloured:

C. hiemalis, C. douglasii*.

II. Leaves hirsute or puberulent

a. Fruit red:

C. grandiflora*, C. punctata*, C. pyrifolia*, C. succulenta*, C. cuneata.

b. Fruit yellow:

C. uniflora*, C. dippeliana.

It is clear from this synopsis that the distinction between the two main groups (A and B) rests solely on the ambiguous difference in leaf venation, and that most of the smaller groups are geographically heterogeneous in that they include species from both centres of distribution.

More recently, copious cytological information in the form of chromosome numbers of Crataegus species has been accumulating, and it seemed worthwhile to put it to some taxonomic use in testing Lange's classification of the genus. Therefore, chromosome numbers of all 121 Crataegus species studied cytologically so far have been collected from the following sources: Longley (1924), Tischler (1950), Darlington and Wylie (1955), Löve and Löve (1961), Fedorov (1969) and Moore (1973). The basic chromosome number (x) has been calculated for the species and it soon became apparent that they have chromosomes either in multiples of 8 (32, 48, 64, 72), or in multiples of 17 (34, 51, 68), with 11 species whose reported chromosome counts conform with both values of x . Furthermore, data on the geographical distribution of each of

these species has been extracted from appropriate floras (e.g. Britton and Brown, 1947; Komarov, 1939) and the Index Kewensis, and pieced together with its value of x . A novel correlation between the two attributes of the plants has emerged and led to their re-arrangement into the two main groups (A' and B') given in Table 1, where the species with both values of x have been referred to one of the two groups according to their geographical distribution.

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 Table 1. Arrangement of 121 Crataegus species into two groups (A' and B'). * = a species with two basic chromosome numbers (8 and 17); ** = a N. American species placed among the non-American species of Group B'.
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Group A' (75 spp.)

Species exclusively North American; $x = 8$:

Crataegus apposita Sarg.*, C. arnoldiana Sarg., C. asperifolia Sarg., C. assurgens Sarg., C. bartoniana Sarg., C. bealii Sarg., C. bissellii Sarg., C. boytoni Beadle, C. brunetiana Sarg., C. buckleyi Beadle, C. canbyi Sarg., C. chapmani Ashe, C. coccinioides Ashe, C. cognata Sarg.*, C. collina Chapm., C. cordata Soland, C. crus-galli L.*, C. cuprea Sarg., C. dacroides Sarg., C. delawarensis Sarg., C. delosii Sarg., C. diffusa Sarg., C. disperma Ashe, C. dodgei Ashe, C. douglasii Lindl.*, C. eamesii Sarge., C. exclusa Sarg., C. flabellata Sarg., C. flavida Sarg., C. fluviatilis Sarg., C. foetida Ashe, C. forbesae Sarg., C. fusca Sarg., C. hillii Sarg., C. holmesiana Ashe, C. inducta Ashe, C. infera Sarg., C. intricata Lange*, C. jackii Sarg., C. lanuginosa Sarg., C. lobulata Sarg., C. margaretta Ashe, C. meticulousa Sarg., C. modesta Sarg., C. mollis Scheele, C. nitida Sarg., C. padifolia Sarg., C. painteriana Sarg., C. pallens Beadle, C. palmeri Sarg., C. paucispina Sarg., C. pausiaca Ashe, C. peckii Sarg., C. pedicellata Sarg.*, C. pentandra Sarg., C. phaenopyrum Borckh., C. pinetorum Beadle, C. pringlei Sarg., C. punctata Jacq., C. pusilla Sarg., C. pygmaea Sarg., C. rotunda Sarg., C. rotundifolia Moench.*, C. sargentii Beadle, C. sera Sarg., C. sertata Sarg., C. smithii Sarg., C. stonoi Sarg., C. tarda Sarg., C. tardipes Sarg., C. tomentosa L., C. treleasei Sarg., C. verecunda Sarg., C. vicina Sarg., C. wheeleri Sarg.

Table 1 (cont.)

Group B' (46 spp.)

Species mostly European and Asian; $x = 17$:

C. almaatensis Pojark., C. altaica Ledeb., C. armena Pojark., C. aronica (L.) Bosc. ex DC., C. atrocarpa Wolf, C. atrofusca Stev. ex Fisch., C. atosanguinea Pojark., C. caucasica C. Koch, C. chlorosarca Maxim., C. crenulata Roxb., C. curvisepala Lindm., C. dahurica Koehne, C. deweyana Sarg.**, C. hissarica Pojark., C. lavalléi Hérinçq.**, C. lawrencensis Sarg.**, C. maximowiczii C.K. Schneid., C. meyeri Pojark., C. microphylla C. Koch, C. monogyna Jacq.*, C. orientalis Pallas, C. oxyacantha L.*, C. pentagyna Waldst. et Kit., C. pinnatifida Bunge, C. pojarkovae Kossyçh, C. pontica C. Koch, C. pruinosa C. Koch*, C. pseudoambigua Pojark., C. pseudoazarolus Pojark., C. pseudoheterophylla Pojark., C. pseudomelanocarpa Popov ex Lincz., C. remotiloba Raiková ex Popov, C. sanguinea* Pallas, C. schraderiana Ledeb., C. songarica C. Koch, C. sphaenophylla Pojark., C. stankovii Kossyçh, C. stevenii Pojark., C. stipulosa Steud.**, C. submollis Sarg.**, C. taurica Pojark., C. tournefortii Griseb., C. turcomanica Pojark., C. turkestanica Pojark., C. ulotricha Pojark., C. uniflora Münchh.**.

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Obviously, the two groups A' and B' in Table 1 are at variance with Lange's system as they cut across his two main groups (A and B) and most of their subordinate groups as well. The recognition of our two groups A' and B' is by no means a formal proposal for the subdivision of the genus Crataegus into 2 new sub-genera; it rather represents an indication of a long-neglected correlation between the geographical distribution and the chromosome numbers of the species that can be of potential taxonomic value pending an extensive investigation of the genus.

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